



6712-01

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Part 73

[GN Docket No. 12-268; ET Docket Nos. 13-26 and 14-14; FCC 14-157]

Expanding the Economic and Innovation Opportunities of Spectrum through Incentive Auctions

AGENCY: Federal Communications Commission.

ACTION: Final rule.

SUMMARY: This document addresses several outstanding issues related to the Incentive Auction. The Commission addresses and rejects proposals for additional limits on any new interference between television stations as a result of the repacking process. The Commission establishes a methodology and the associated input values to predict inter-service interference between television and wireless services in certain areas for use during the incentive auction (ISIX Methodology).

DATES: Effective [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE **FEDERAL REGISTER**], except for §§ 73.3700(b)(1)(iv)(B), 73.3700(b)(2)(i) introductory text, and 73.3700(b)(2)(ii) of the rules which contain new or modified information collection requirements subject to the Paperwork Reduction Act of 1995, Public Law 104-13, that are not effective until approved by the Office of Management and Budget (OMB). The Federal Communications Commission will publish a document in the Federal Register announcing OMB approval and the effective date of this rule.

FOR FURTHER INFORMATION CONTACT: Aspasia Paroutsas, (202) 418-7285, Aspasia.Paroutsas@fcc.gov, Office of Engineering and Technology.

SUPPLEMENTARY INFORMATION: This is a summary of the Commission's Second Report and Order and Further Notice of Proposed Rulemaking, GN Docket No. 12-268; ET Docket Nos. 13-26 and 14-14, FCC 14-157, adopted October 16, 2014 and released October 17, 2014. The full text of this

document is available for inspection and copying during normal business hours in the FCC Reference Center (Room CY-A257), 445 12th Street, SW., Washington, DC 20554. The complete text of this document also may be purchased from the Commission's copy contractor, Best Copy and Printing, Inc., 445 12th Street, SW., Room, CY-B402, Washington, DC 20554. The full text may also be downloaded at: www.fcc.gov. People with Disabilities: To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an e-mail to fcc504@fcc.gov or call the Consumer & Governmental Affairs Bureau at 202-418-0530 (voice), 202-418-0432 (tty).

Summary of Second Report and Order

Requested Additional Limits on New Interference in the Repacking Process

1. The Commission declined to establish a one-percent cap on the amount of total or aggregate new interference that a broadcast station will be allowed to receive from other stations, as requested by the National Association of Broadcasters (NAB) and others. In the Incentive Auction R&O, 79 FR 48442, August 15, 2014, the Commission adopted a 0.5 percent limit on new interference that will be applied on a pairwise or station-to-station basis. The Commission concludes that broadcasters' concerns regarding the potential for new interference in the absence of a separate one-percent cap on aggregate interference are exaggerated: the vast majority of stations are unlikely to experience aggregate new interference of more than one percent. The Commission also adopted measures that will effectively address broadcasters' concerns about such interference in exceptional cases where there may be aggregate new interference of more than one percent. In addition to being unnecessary, the proposed cap is not practical or realistic, because even if the broadcasters had identified a means of implementing it (they have not), an aggregate interference cap would deprive the reverse auction bidding process of its speed and, therefore, compromise the success of the incentive auction. The Commission concludes that it can fulfill Congress's mandate to make "all reasonable efforts" to preserve the population served of stations that will remain on the air after the incentive auction without imposing an aggregate interference cap. Crucially, the Commission can do so in a manner that ensures an efficient channel assignment scheme, minimizes repacking costs and

disruption to broadcasters and viewers, and furthers the goal of a successful auction. The Commission also declined to adopt an additional limit on new interference to stations that are currently experiencing ten percent or more interference within their service areas.

Background

2. Section 6403(b)(2) of the Spectrum Act requires the Commission, in reorganizing or “repacking” the broadcast television bands, to “make all reasonable efforts to preserve, as of [February 22, 2012], the coverage area and population served” of eligible television stations. In the Incentive Auction R&O, the Commission interpreted this mandate to require “that we use all reasonable efforts to preserve each station’s coverage area and population served without sacrificing the goal of using market forces to repurpose spectrum for new, flexible uses.” Consistent with that interpretation, the Commission adopted an approach to preserving population served under which no channel assignment, “considered alone, may reduce another station’s specific population served by more than 0.5 percent.” The Commission’s rules treat 0.5 percent interference or less as de minimis or no new interference, as this amount rounds to zero at integer precision. Under this approach, the Commission will only consider station-to-station (or “pairwise”) interference when determining whether a particular channel assignment is permissible.

3. While most commenters, including the broadcast industry, supported the Commission’s approach to pairwise interference, NAB, supported by other broadcasters, urged the Commission to adopt two additional measures. First, NAB asked that the Commission cap the amount of total new interference that a station may receive at one percent. According to NAB, “while an individual station can only cause a maximum addition of 0.5 percent interference . . . , ‘stations repacked during the incentive auction process . . . would likely receive interference from multiple stations’ which, in the aggregate, could ‘lead to significant viewer losses.’” Second, noting that some stations currently receive up to ten percent interference, NAB requested that the Commission prevent any new interference to these stations. The Commission deferred a decision on these proposals, explaining that FCC staff would be “releasing a Public Notice inviting comment on a staff analysis of the potential impact of aggregate interference on television

stations as a result of the repacking process,” and that the Commission would resolve the issue in a subsequent order.

4. The staff released its analysis on June 2, 2014. The Aggregate Interference PN explained that the staff analysis was based on updated “constraint files” for each station developed using the repacking approach adopted in the Incentive Auction R&O, including the pairwise approach to preserving population served. Using these constraint files, the staff conducted 100 simulations of the repacking process, based on two different spectrum recovery scenarios (84 MHz and 120 MHz) and applying several different approaches to select which stations went off the air as a result of the reverse auction, producing a channel assignment plan for each simulation. The staff then calculated the aggregate or total predicted new interference from all stations to each station’s population served for every channel plan. Across all of the simulations, no station was predicted to receive aggregate new interference of two percent or more. One percent of stations were predicted to receive aggregate new interference between one and two percent, while the vast majority of stations (approximately 88 percent) were predicted to receive aggregate new interference of well under the 0.5 percent de minimis threshold.

Stations are Highly Unlikely to Experience Aggregate Interference of More than One Percent

5. Broadcasters’ concerns regarding the potential for aggregate new interference to more than one percent of their viewers in the absence of a cap are overstated: the vast majority of stations are unlikely to experience significant new interference as a result of the repacking process. NAB points to a sample New York station which has seven stations causing some unique, non-overlapping interference, arguing that without a cap this station could receive new aggregate interference of two to three percent as a result of the repacking process. However, NAB’s analysis includes existing patterns of interference—that is, areas in which viewers do not currently receive service from a station due to interference from other stations—which the repacking approach does not consider in seeking to preserve population served. Staff analysis applying the repacking approach adopted in the Incentive Auction R&O predicts that the

overwhelming majority of stations (approximately 99 percent) will not experience new interference above the proposed cap. Only one percent of all stations were predicted to receive aggregate new interference between one and two percent, with no station predicted to receive two percent or greater. In addition, the vast majority of stations (approximately 88 percent) across all 100 simulations conducted by the staff were predicted to receive new interference from all stations of well under the 0.5 percent de minimis threshold. These results indicate that the station-to-station or pairwise approach to preserving population served that the Commission adopted in the Incentive Auction R&O is sufficiently conservative to prevent the crowded market scenario that concerns NAB.

6. Accuracy of the Underlying Data. NAB questions the accuracy of the staff analysis based on purported anomalies in the underlying data. The updated constraint files underlying the staff analysis consist of two files for each television station: a “domain” file that lists all of the channels to which the station could be assigned considering fixed constraints, and an “interference-paired” file that lists all of the other stations that could not be assigned to operate on the same or on an adjacent channel with that station (because the stations’ interference relationship would violate the 0.5 percent new pairwise interference threshold). NAB points to two examples in which the files reflect that two or more stations cannot be assigned to the same channel on certain frequencies, but may be assigned to the same channel on nearby frequencies. According to NAB, these “results appear highly unlikely given that . . . the change in the amount of interference caused between assigning closely spaced channels . . . is not significant.” The examples NAB identifies represent neither an error nor an inconsistency in the underlying data. These results simply demonstrate that predicted interference will change slightly as stations move from one channel to another because radio waves propagate differently on different frequencies. The slight variations may result in situations where stations cannot operate on one channel under the applicable constraints, but may operate on a nearby channel, because such variations cause the interference relationship between two stations to go above or below the 0.5 percent interference threshold. Thus, NAB’s examples do not reflect inconsistencies or errors in the updated constraint files underlying the staff

analysis.

7. Robustness of the Studies. The Commission also rejected NAB's claims that the staff analysis is skewed by the spectrum recovery scenarios studied and understates the potential for new aggregate interference. Arguments that lower levels of broadcaster participation in the reverse auction (resulting in less spectrum recovered) increase the potential for new aggregate interference in crowded markets are based on a misunderstanding of the repacking process. In the 84 and 120 MHz scenarios studied by the staff, higher levels of participation are required because more stations would have to voluntarily relinquish their spectrum usage rights in order for the Commission to be able to repack the remaining stations consistent with the constraints adopted in the Incentive Auction R&O. In other words, more stations would have to go off the air because fewer channels would be available in the TV spectrum to repack broadcasters. If, on the other hand, fewer broadcasters choose to participate, as NAB contends is likely, the pairwise constraints would prevent the auction from repurposing as much spectrum, leaving more television channels available to assign to stations. Regardless of how much spectrum is recovered, the constraints remain static throughout the auction, and provide limits to whether and how stations may be repacked.

8. The results of the staff's analysis were consistent across broadcaster participation rates, which ranged from 80 to 100 percent, and across a large (36 MHz) difference in the two spectrum recovery scenarios studied. This consistency confirms that lower levels of broadcaster participation—and scenarios in which less spectrum is recovered—will not have a significant impact on new aggregate interference. The staff's approach to selecting the stations to voluntarily go off the air in the simulations also ensured that virtually every station was part of at least one simulation in which that station remained on the air. Accordingly, we reject NAB's contention that the results of the staff analysis are unreliable.

9. Release of Simulation Software. The Commission rejects contentions that the Aggregate Interference PN comment period was too short and that meaningful comment on the staff analysis was impossible without access to the simulation software that the staff used to generate constraint files and

perform feasibility checks. The Aggregate Interference PN provided 30 days for comments and an additional 20 days for reply comments, and parties have had additional time to analyze the study (and to submit ex parte filings) since the comment period closed. Ample information has been made publicly available to allow for meaningful input on the staff analysis and its results, including the methodology, data, and assumptions underlying the analysis. Moreover, in the interest of transparency and encouraging meaningful input, the Commission and its staff have made extensive information about the repacking process publicly available over the course of this proceeding. The data and methodology required to simulate repacking scenarios were first detailed more than a year ago in the Repacking Data PN. The staff provided technical detail about how software could be used to perform “feasibility checks” (that is, to determine whether channels can be assigned to all of the stations eligible for protection in the repacking process consistent with the constraints imposed by the Spectrum Act) in January 2014, and further detailed the staff’s repacking simulation software in a subsequent workshop. Thus, interested parties have had sufficient time and information to comment meaningfully on the staff analysis.

Measures to Address Aggregate Interference of More than One Percent in Exceptional Cases

10. The Commission adopted two measures to address exceptional cases where a station is predicted to receive aggregate new interference in excess of one percent. First, it will use optimization techniques that seek to avoid final channel assignments that would result in aggregate new interference of more than one percent. After the incentive auction bidding closes and the set of stations that will remain on the air in each band is established, the Commission plans to employ optimization techniques to determine a final channel assignment scheme from the provisional channel assignments identified during the reverse auction bidding process. During this final channel assignment process, the Commission can take time to account for factors in addition to feasibility, such as aggregate new interference, without compromising the speed of the reverse auction bidding process. Among other objectives, it intends to seek a final channel assignment that minimizes new aggregate interference above one percent. Although the

current rules do not provide broadcasters with complete protection from aggregate interference caused by other broadcast stations, the Commission chose a one percent threshold in light of broadcasters' stated concerns about aggregate interference exceeding this amount.

11. Although the Commission anticipates that this final channel assignment optimization procedure will further reduce the already-small number of stations that are predicted to receive new interference greater than one percent, it cannot guarantee this result in every case. The optimization procedure can identify the best final channel assignment scheme given the station-to-band assignments produced by the reverse auction. However, the Commission cannot change these assignments after the bidding stops and the final stage rule is met without undoing the entire auction. Accordingly, as an additional safeguard, if a station is predicted to receive new interference above one percent on the final channel assigned to it following the repacking process, the Commission will provide it with the opportunity to file an application proposing an alternate channel or expanded facilities in a priority filing window, along with a limited number of other stations that have been assigned the same priority. This opportunity will be available to any station entitled to protection in the repacking process that is predicted to experience aggregate new interference in excess of one percent, regardless of whether that station was reassigned to a new channel in the repacking process. Taken together, the final channel assignment optimization procedure and post-assignment facilities modification processes will provide a "safety valve" in the exceptional cases where new aggregate interference above one percent has occurred or is likely to occur.

An Aggregate Cap Would Deprive the Reverse Auction Bidding Process of Its Speed and Threaten the Success of the Auction

12. In addition to being unnecessary for the reasons described above, imposition of an aggregate interference cap would compromise the central objective of a successful auction that allows market forces to determine the highest and best use for spectrum. Speed is critical to the successful implementation of the incentive auction: The repacking methodology must be capable of analyzing complex technical issues

fast enough to not unduly slow down the bidding process. Under the repacking approach adopted in the Incentive Auction R&O, only one provisional channel assignment scheme that meets all of the constraints need be identified for the reverse auction bidding to proceed. Tens of thousands of individual “feasibility checks” may need to be run in each bidding round, and examining interference relationships only on a “pairwise” or station-to-station basis is the only way to identify a “feasible” repack analysis quickly enough to meet the Commission’s objectives for the reverse auction. As discussed, the Commission intends to account for factors beyond mere feasibility without compromising the bidding process by seeking to optimize provisional channel assignments after the bidding stops: once the set of stations that will remain on the air in each band after the auction is complete has been established, the Commission intends to use optimization techniques to determine a channel assignment that limits the amount of aggregate new interference for any station.

13. It would be significantly more complicated and, as a result, time-consuming to consider the amount of aggregate interference from all sources that a station may receive on its provisional channel during the bidding process, as would be necessary to implement a cap on aggregate interference. Specifically, after the repacking process identifies a provisional channel assignment for a station that is feasible—based on the pairwise constraints—the aggregate interference of the provisional assignments for all of the other stations that may need to be assigned a channel (non-participating stations and stations that continue to participate in the bidding) would have to be determined in a separate step. If the cap were exceeded, then the assignment would have to be disallowed and a new assignment identified. This iterative process would have to be repeated until either a provisional channel assignment were found that satisfies the cap or all possible assignments were eliminated. The same analysis would need to be performed repeatedly for each station that continues to participate in the bidding process, leading to possibly an exponential number of feasibility checks for each round of the auction. Such an approach would deprive the repacking feasibility checker of its speed and threaten the success of the incentive auction.

14. Despite the results of the staff analysis discussed, broadcasters argue that the Commission must adopt the proposed cap under the “all reasonable efforts” mandate because doing so would not significantly increase repacking constraints. The Commission disagrees. As explained in the Incentive Auction R&O, the Commission interprets the statutory mandate in light of the other objectives of the Spectrum Act, including the goal of repurposing spectrum for new, flexible uses. Requiring steps that would impede the Commission’s ability to conduct a successful auction would sacrifice this goal and therefore is not “reasonable” within the meaning of the statute given the results of the staff analysis. The Commission adopted measures that will effectively address broadcasters’ concerns regarding aggregate new interference. The Commission has not identified, and no commenter has suggested, a means of implementing the proposed cap without compromising the speed of the bidding process, which is critical to conducting a successful auction. Under the circumstances, the Commission concludes that the statute does not require adoption of the proposed cap.

15. The Commission also rejects NAB’s assertion that failure to adopt the proposed cap would undermine the voluntariness of the reverse auction. The Commission does not believe—and NAB has not demonstrated through record evidence—that the possibility of an increase in aggregate new interference, such as the remote possibility predicted in the staff study, would so devalue a broadcaster’s license (or increase its costs) that it would coerce a broadcaster to participate in the auction.

Proposed Cap on Any New Interference to Certain Stations

16. The Commission also declined NAB’s suggestion to adopt a cap on any new interference to stations that are currently experiencing ten percent or more interference within their service areas. As explained in the Incentive Auction R&O, the Commission interprets section 6403(b)(2) of the Spectrum Act “to require efforts to preserve service to those viewers who had access to a station’s signal within its protected coverage area as of” the statutory date. Accordingly, it base comparative evaluations of interference on the population that a station was predicted to serve as of the statutory date. Thus, the interference level that the stations in question were experiencing as of the statutory date is their baseline

for repacking purposes. Adopting NAB's suggestion would increase the constraints on the repacking process, hindering the Commission's ability to repack TV spectrum. In addition, the Commission does not believe the statutory "all reasonable efforts" mandate warrants granting these stations greater interference protection than the current rules. The Commission therefore declines to treat these stations differently from other stations in the repacking process.

Requested Cap on Viewer Losses Due to Channel Reassignments

17. In a recent ex parte filing, NAB criticizes the staff's analysis for ignoring potential terrain losses due to channel reassignments that could cause some stations to lose viewers, and argues for the first time that the Commission must adopt "an aggregate cap on . . . the percentage decrease in population served as a result of repacking during the incentive auction process." The Commission declines to address NAB's new requested cap here. Prior to NAB's recent filing, no commenter proposed such a cap. Rather, NAB and others advocated a cap on aggregate interference between stations, and the purpose of the staff's analysis was to study the potential for such interference. The interference cap that NAB previously advocated would have no effect whatsoever on terrain losses, because such losses are not caused by interference between stations. Thus, NAB's request for an aggregate cap on population loss is outside the scope of this item.

18. Although the Commission declines to address NAB's requested new cap here, consistent with the Commission's decision above to use optimization techniques to seek to avoid final channel assignments that would result in aggregate new interference of more than one percent, the Commission concludes that it should use optimization techniques to seek to avoid final channel assignments that would result in significant viewer losses due to terrain losses. The Commission did not decide now on an optimization technique to carry out this objective, because unlike interference between stations, terrain losses can be avoided by optimizing for various factors. For example, minimizing channel moves will avoid terrain losses while also reducing broadcaster relocation costs, because a station that stays on the same channel will not experience terrain losses. Similarly, preferring moves to channels lower in the UHF

band will avoid terrain losses while also serving the Commission's goal of repurposing UHF spectrum contiguously from channel 51 down. The Commission will seek comment on optimization factors for the final channel assignment scheme, including factors that would help both directly and indirectly to avoid final channel assignments that would result in significant viewer losses due to terrain losses, in the forthcoming Incentive Auction Comment PN. Although different measures may be necessary to protect viewers from loss of service due to terrain losses and interference, consistent with the statutory mandate we will make all reasonable efforts to preserve television service to all existing viewers.

ISIX Methodology and Input Values To Determine 600 MHz Band Wireless License Area

Impairments During the Incentive Auction

19. The Commission adopts here the ISIX Methodology and input values proposed in the ISIX PN, see Office of Engineering and Technology Seeks to Supplement the Incentive Auction Proceeding Record Regarding Potential Interference Between Broadcast Television and Wireless Services, Public Notice, 29 FCC Rcd 712 (2014) with certain modifications, for use during the incentive auction. The ISIX Methodology is set forth in detail in Appendix A (Technical Appendix) of the Second R&O. The ISIX Methodology and input values will be used during the auction to estimate the extent to which 600 MHz Band wireless license areas may be “impaired” due to predicted interference to, or from, broadcast television stations assigned to the 600 MHz Band as a result of market variation. “Impaired” license areas may include “infringed” and/or “restricted” areas. An “infringed” area is one where wireless operation is predicted to receive harmful interference from a television station that is placed in the 600 MHz Band. Wireless licensees will be free to operate in infringed areas but will assume the risk of receiving interference from a television station. A “restricted” area is one where wireless operations would be predicted to cause harmful interference to a television station that is placed in the 600 MHz Band, depending on how the wireless operations are deployed.

20. Because new 600 MHz Band wireless operations will not be deployed until after the incentive auction, the ISIX Methodology and input values the Commission adopted in this Order necessarily rely on

a number of assumptions, all of which are described in the ISIX PN and the Technical Appendix. To the extent that the Commission changed any of the assumptions proposed in the ISIX PN the basis for such changes is explained below. The Commission also addressed commenters' objections to certain aspects of the ISIX Methodology and input values. The results of the ISIX Methodology and input values adopted in the Second Report and Order may be used for several purposes during the incentive auction. The Commission will address these uses in the forthcoming Comment PN on auction procedures. Importantly, the Commission does not determine in this Order how the ISIX Methodology and input values will be applied following the incentive auction.

21. Although the ISIX Methodology may be characterized as more complex than the distance-based approach advocated by some commenters, the Commission concludes that the ISIX Methodology's ability to account for different inter-service interference scenarios, local terrain obstacles and other factors make it significantly more spectrally efficient than a distance-based approach, and these benefits outweigh the costs of greater complexity. Also, its granularity is better suited to the requirements of conducting the incentive auction than a distance-based approach. Accordingly, the Commission adopts the ISIX Methodology.

Background

22. In the Incentive Auction R&O, the Commission adopted a flexible band plan framework that accommodates market variation. Market variation occurs where broadcast stations remain on spectrum that is repurposed for wireless broadband under the 600 MHz Band Plan. The Commission explained that accommodating market variation is necessary because the amount of spectrum recovered along the Canadian and Mexican borders and in some markets may vary from that recovered in most markets nationwide. Accommodating market variation will allow for avoiding limits to the amount of spectrum repurposed across the nation to what is available in the most constrained market.

23. Broadcasters and several other industry participants raised concerns over the potential for inter-service interference created by market variation. This potential interference results because, in

constrained markets where broadcast television stations are assigned to channels within the 600 MHz Band, television services and wireless services will be operating in close geographic proximity on either the same or adjacent frequencies. Some commenters proposed fixed geographic separation distances to mitigate such potential interference.

24. On January 29, 2014, the Commission's Office of Engineering and Technology (OET) released a Public Notice seeking comment on an alternative to the fixed separation distance methodology to address inter-service interference. The ISIX Methodology is intended to accommodate market variation in a more spectrally efficient manner than fixed separation distances. The rationale underlying the proposed ISIX Methodology was that a fixed geographic separation distance approach would be spectrally inefficient because it would group together different inter-service interference scenarios (e.g., wireless base station to television receiver, television transmitter to wireless user equipment, etc.) and apply separation distances based on the worst case scenario, without considering factors such as technical characteristics (i.e. antenna height, power), terrain variability, and density of population.

25. The ISIX PN discussed the varying degrees of spectral overlap between broadcast television and wireless services will impact to different degrees the potential for harmful interference between the two services. Under the 600 MHz Band Plan adopted in the Incentive Auction R&O, six megahertz broadcast television channels will be repurposed as five megahertz wireless blocks. The difference in channel bandwidth (six vs. five megahertz) means that the wireless spectrum blocks will not perfectly align with the existing television channels and, where market variation exists, there will be varying degrees of spectral overlap between the channels. As the wireless spectrum block moves from complete overlap in frequency with a television channel to an edge-to-edge separation of five megahertz, the level of undesired signal that the victim receiver can tolerate without experiencing interference increases. The ISIX PN proposed to define "co-channel operations" as any spectral overlap between a wireless spectrum block and a television channel in one megahertz increments ranging from +5 (complete overlap) to +1 megahertz, and "adjacent channel operations" as a wireless spectrum block and television channel that do not overlap

but are separated by less than five megahertz (edge to edge separation of five megahertz or less).

26. The ISIX PN outlined four scenarios of potential interference when broadcast television and wireless operations are co-channel or adjacent channel in nearby markets: (1) digital television (DTV) transmitter to wireless base station (Case 1); (2) DTV transmitter to wireless user equipment (Case 2); (3) wireless base station to DTV receiver (Case 3); and (4) wireless user equipment to DTV receiver (Case 4).

Digital Television to Wireless Interference (Cases 1 and 2)

27. The Commission adopted the ISIX Methodology and input values as proposed in the ISIX PN for use during the incentive auction to predict interference from DTV transmitters to wireless base stations (Case 1) and wireless user equipment (Case 2), except that it will not consider clutter loss for Case 2. While wireless commenters support the proposed consideration of clutter loss for Case 2, the Commission determined that considering clutter loss would not improve the accuracy of the ISIX Methodology. The resolution of the clutter database is 30 meters and, therefore, every grid cell would have more than 4,000 associated clutter values. The one clutter value selected in each cell would not be representative of the entire cell and thus would fail to provide for an accurate assessment of the interference environment.

28. The Commission will use the proposed F(50,50) statistical measure to predict the strength of an interfering television signal within the wireless license area for Cases 1 and 2 rather than the F(50,10) measure advocated by broadcasters. The F(50,50) measure assumes that the DTV signal will be strong enough to interfere with the wireless base station or wireless user equipment in 50 percent of the locations within the wireless license area 50 percent of the time; the F(50,10) measure would assume that the interfering signal will be strong enough to interfere in 50 percent of the locations 10 percent of the time. The Joint Broadcasters support use of the F(50,10) measure as more conservative and more consistent with Commission practice. The Commission concludes that the F(50,50) measure is more appropriate for use in predicting interference from DTV signals to wireless operations during the auction. First, the F(50,50) measure will not risk harming broadcasters because it will be applied only during the incentive auction and only to predict interference to wireless operations from television stations for auction-related purposes, not

to protect television signals. Second, the majority of wireless providers, who have the greatest stake in the accuracy of predicted inter-service interference to wireless operations, support use of the F(50,50) measure, supporting the conclusion that it will provide a reasonably accurate assessment of such interference. Third, use of the F(50,50) measure is appropriate in this context because various techniques are available to wireless operators to avoid harmful interference to wireless base stations that are not available to television stations or viewers. Accordingly, the Commission disagrees with the Joint Broadcasters that use of the F(50,50) measure is inconsistent with Commission practice in predicting interference between DTV stations. Under the circumstances, the Commission concludes that use of the more conservative F(50,10) measure is neither necessary nor consistent with the Commission's goals for the incentive auction.

29. The Commission declines to adopt Qualcomm's suggested parameters for wireless user equipment in lieu of the parameters proposed in the ISIX PN. While the antenna gain value suggested by Qualcomm may reflect today's smartphones, the Commission expects other wireless devices to be used in the 600 MHz Band, like tablets or personal Wi-Fi hotspots, that could have either a higher antenna gain or a better antenna efficiency and thus be more susceptible to harmful interference. The Commission finds it appropriate to account for the types of devices that will most likely be used in the 600 MHz Band. Qualcomm also claims that the proposed parameter value for noise figure should be increased from 7.5 dB to 9 dB. However, the proposed value accounts for factors in addition to receiver noise that should be considered when calculating an effective noise figure. Therefore, the Commission declines to adopt Qualcomm's suggested values for wireless user equipment.

30. The Commission declines to adopt the Joint Broadcasters' suggested fixed distance-based approach for Cases 1 and 2. The Joint Broadcasters' approach for Case 1 (television transmitter to wireless base station) would create unreasonably large zones where wireless operations would be deemed "impaired" by interference because their approach does not account for specific terrain obstacles that mitigate the potential for interference from television stations to wireless operations. As a result, it would

significantly increase the predicted impairments to wireless license areas and exclude from the forward auction spectrum that could otherwise be offered for wireless services if impairments were assessed more accurately. For example, under the Joint Broadcasters' proposal, a television station in Los Angeles could be predicted to interfere with wireless operations in Las Vegas. In contrast, the ISIX Methodology would evaluate the effect of terrain on the propagation of the interfering television signal. As a result, areas shielded by terrain, such as mountains, would not be identified as impaired by potential interference that is not likely to occur in those locations. Applying the ISIX Methodology in the example above, wireless operations in Las Vegas would not be considered impaired because of the shielding provided by the San Gabriel and San Bernardino mountain ranges. As a result, a wireless license in Las Vegas would be deemed unimpaired because of this terrain shielding and can therefore be auctioned even when there is a television station co-channel or adjacent channel in Los Angeles. The approach the Commission adopted will assess the interference environment and wireless license area impairments significantly more accurately in Case 1 than the Joint Broadcasters' suggested approach of a generic separation distance.

31. For Case 2 (television transmitter to wireless user equipment), the Joint Broadcasters' proposed five-kilometer separation distance would not adequately reflect the potential impairment to a wireless license area. The Joint Broadcasters conflate their proposed separation distances for Case 1 with those for Case 2 and assume that the Case 1 distances will preclude wireless user equipment from operating near a television station. As stated, however, the Case 1 interference scenario will only occur if a television station is placed in the 600 MHz uplink spectrum, while Case 2 will only occur if a television station is placed in the 600 MHz downlink spectrum. In addition, wireless user equipment is more sensitive than television receivers, and the high power and height of typical DTV transmitters require separation distances that can be much greater than five kilometers. However, adopting a generic distance-based separation to provide additional protection for wireless user equipment would raise the same concerns discussed with regard to Case 1. Therefore, the approach of predicting the specific locations (on a two-kilometer grid) where the interfering DTV field strength exceeds the thresholds will provide wireless

providers with more accurate information as to wireless license area impairments.

32. Although the Commission recognizes that the ISIX Methodology it adopts may be more complex than a fixed distance-based approach, the Commission concludes that the added complexity of this approach is justified by its benefits. The ISIX Methodology's granularity, tailored approach to different interference scenarios, and ability to account for factors that will mitigate interference in individual cases will generally lead to more accurate interference predictions. This is critical to meeting the Commission's goals for the incentive auction because overestimating the extent of wireless license area impairments may limit the ability to repurpose spectrum for new uses through the auction. Moreover, more accurate predictions and more granular data will allow for more informed decisions, both for the Commission in determining whether to auction certain licenses and for auction participants in making bidding decisions. The Commission also notes that, contrary to the Joint Broadcasters, most commenters support the ISIX Methodology. For Cases 1 and 2, the Commission therefore concludes that the benefits of the ISIX Methodology's increased accuracy over an oversimplified fixed distance-based approach outweigh its costs in terms of additional complexity.

Wireless Base Station to Digital Television Receiver (Case 3)

33. The Commission adopted the ISIX Methodology and input values as proposed in the ISIX PN for use during the incentive auction to predict interference from wireless base stations to DTV receivers (Case 3), except that (1) the Commission adopted slightly higher D/U ratios (by 1 dB) for co-channel operations based on the measurements conducted by the staff and CEA, and (2) the Commission will not consider clutter loss.

34. D/U ratios. The ISIX PN was premised on the assumption that ATSC DTV and LTE signals are sufficiently similar that the D/U ratios in the rules for television-to-television interference can be used in predicting interference from wireless base stations to television receivers. In response to concerns raised by some commenters, OET measured the susceptibility of a number of DTV receivers to interference from LTE signals, and CEA conducted additional measurements with six different DTV

receivers. The Commission concluded that the record supports the D/U ratios proposed in the ISIX PN for adjacent channel interference based on the measurements conducted by staff and CEA. However, based on the measurement data, LTE signals create slightly more co-channel interference to DTV reception than other DTV signals. The Commission concludes that the D/U ratios proposed in the ISIX PN for co-channel interference should be increased by 1dB from 15 dB to 16 dB in light of this data. Therefore, the Commission adopted the following D/U ratios for different degrees of spectral overlap in Case 3. This adjustment will result in a more accurate determination of impairments to co-channel wireless operations to any broadcast television stations that are assigned to the downlink 600 MHz Band spectrum as a result of market variation. The D/U ratios are accordingly adjusted as shown in Table 1, paragraph 43 of the Second Report and Order.

35. While one receiver OET measured was predicted to receive interference at the D/U ratios the Commission adopted in this Order, it concludes that this result does not undermine the Commission's decision. This receiver is a digital-to-analog converter box. While the Commission recognizes that such converter boxes remain in use and are still commercially available, the analog-only television receivers they are used with are reaching the end of their life cycles. Television receivers with digital tuners have no need of such converter boxes, and new television receivers have been required to include digital tuners since July 2004. Thus, most television receivers purchased since then have no need for a converter box. The Commission declines to adjust the D/U ratios it adopted based on the susceptibility to LTE signal interference of obsolete analog-to-digital converter boxes, the vast majority of which will no longer be in service during and after the 39-month Post Auction Transition Period.

36. Although broadcasters argue for more measurements, no commenter disagrees that DTV and LTE signals behave similarly because both have noise-like emission characteristics. The measurement data from OET and CEA encompasses most new models of DTV receivers, as well as a representative sample of older models. With the exception of the one digital-to-analog converter box that is no longer likely to be in use within a few years, none of the DTV receivers OET tested was susceptible to LTE signal

interference at the D/U ratios adopted in this Order. Testing additional receivers under different conditions, as broadcasters advocate, would delay this proceeding, and therefore the auction, without contributing meaningfully to the data in the record. Accordingly, the Commission concludes that the D/U ratios it adopted are sufficient to protect DTV receivers from LTE signal interference.

37. The Commission rejects claims that the measurement data in the record is not reliable because it does not consider factors such as multiple LTE interferers, third-order intermodulation (IM3) or taboo interference, and splatter. The Commission's rules governing DTV-to-DTV interference do not address these factors, yet there is no evidence that the rules fail to adequately protect DTV signals as a result. Likewise, OET-69 does not consider taboo interference in its calculations but only considers the interference protections provided in the rules. Equipment manufacturers are aware of these factors and are expected to consider them when designing their receiver products. Because the Commission's existing rules do not include provisions to protect DTV signals from the effects of multiple DTV interferers, IM3 or splatter, the Commission declines to account for such factors in the D/U ratios adopted for Case 3, and concludes that the measurement data in the record is reliable despite the lack of information regarding these factors.

38. While the Commission recognizes the asymmetry in the performance of DTV receivers, the D/U values adopted in the ISIX Methodology are sufficiently conservative to protect against interference from wireless signals on co-channel and adjacent-channel frequencies above or below a received television channel. In addition, the adopted values will protect adjacent-channel operations, by several dB or more. Accordingly, the Commission adopts the values for OFR set forth in Table 9 of the ISIX PN.

39. Clutter Loss. The Commission declined to adopt the proposed use of clutter loss for Case 3 for reasons similar to those set forth above with regard to Case 2. Clutter loss has not been used in the context of interference between television stations, and the Commission concluded that application of a single clutter value in a four-square kilometer area would not improve the accuracy of the ISIX Methodology.

40. Propagation Model. The Commission rejects suggestions that the ISIX Methodology use the Hata or the free space propagation model for Case 3 instead of the Longley-Rice model. The Commission has relied on the Longley-Rice model to predict television coverage and interference for more than fifteen years, and that model is widely accepted for use at the frequencies in the 600 MHz Band.

41. Fixed Distance-Based Approach. The Commission also rejects Joint Broadcasters' fixed distance-based approach for Case 3. Their approach predicts wireless license area impairments greater than those predicted by the ISIX Methodology in some cases, whereas in others it would produce similar results or result in smaller impairments. The critical difference between the two approaches for Case 3, however, is the granularity of the data. The fixed geographic distances under the Joint Broadcasters' approach are not easily converted to the "grid-by-grid" data needed to evaluate potential harmful interference to television stations in the initial optimization process during the auction. The ISIX Methodology provides for a cell-by-cell determination of license impairments which will allow the Commission to make more informed decisions about the appropriate clearing targets for the reverse auction and which wireless spectrum blocks to auction in the forward auction, and also provide additional certainty to bidders in the forward auction. Therefore, the Commission concludes that the ISIX Methodology is better suited to the requirements of conducting the incentive auction than a distance-based approach for Case 3.

42. Technical Parameters. The Commission rejected broadcasters' claims that the parameter values for wireless base station power and height proposed for Case 3 in the ISIX PN are inconsistent with real-world wireless facilities. These typical values were obtained from advisory committees and industry submissions in the record. The Commission has previously considered typical operating parameters in predicting interference, rather than assuming the maximum permissible levels authorized under the Commission's rules. As Sprint notes, the typical parameters may not precisely reflect the parameters that a wireless provider would use in actual deployment, but they are reasonable for purposes of modeling. The Commission emphasizes that the use of typical values for Case 3 will be restricted to the incentive auction,

when actual values will not be available because 600 MHz Band services will not be deployed yet.

43. For purposes of the auction, the ISIX Methodology assumes an Effective Radiated Power (ERP) level of 120 W/MHz for a wireless base station. This power level, which is supported by data in the record, is based on a wireless base station operating with two LTE transmitters, rated at 40 watts (W) each and transmitting at their maximum capable output power (ignoring network effects such as power control) and an antenna gain of 15 dBi. The 15 dBi value is based on manufacturer data on panel antennas designed for operation in frequency bands above and below the 600 MHz Band. An antenna with 15 dBi gain used with two 40 W transmitters and a line loss of 1 dB produces an ERP of 1200 W in a 10 MHz LTE channel, or 120 W/MHz ERP. To simulate the effect on one 6 MHz television channel of wireless operations transmitting across contiguous adjacent 5 MHz wireless blocks, OET multiplied the ERP/MHz by 6, so that the ERP in a 6 MHz channel would be 720 watts.

44. The antenna Height Above Average Terrain (HAAT) value of 30 meters adopted for use in the ISIX Methodology is consistent with real-world network information incorporated in the Commerce Spectrum Management Advisory Committee (CSMAC) Final Report. This report specifies 30 meters as the typical HAAT for base stations in urban/suburban areas where inter-service interference would most likely occur. The wireless industry also supports this assumption. The Joint Broadcasters' analysis overestimates the typical wireless base station antenna height because it is based on the overall height above ground level for the towers hosting a wireless antenna, rather than the height at which the wireless antennas are actually mounted on each tower. Wireless antennas are typically side-mounted on platforms or other supporting structures, resulting in a much lower antenna height than the overall tower height. Moreover, while the Joint Broadcasters' analysis relies on data from American Tower, one of the largest tower management entities in the United States, it excludes rooftop, on-building, and broadcast tower mounted sites. The Commission believes that the typical values adopted are appropriate for modeling a 600 MHz Band wireless network.

45. “Error Code 3” Messages. The Commission disagrees with the Joint Broadcasters that it should assume service in cells where an “error code 3” message appears, rather than using the predicted field strength at such locations. The Joint Broadcasters’ claim that the proposed approach departs from the Commission’s treatment of error warnings ignores the fact that the Commission has treated error warnings differently depending on context. In the Incentive Auction R&O, the Commission decided to assume service in cells where an “error code 3” message appears, because doing so is consistent with the traditional assumption for purposes of applying the OET-69 methodology that service is available throughout a station’s coverage area and that broadcasters locate and configure their transmitters to maximize coverage. In predicting Case 3 interference, however, the Commission found that different treatment of “error code 3” messages is appropriate. If service were to be assumed in the presence of an error warning, the cell in question would be treated as having interference-free service, meaning that potential inter-service interference would be ignored. The result would be a failure to check for inter-service interference at locations where the DTV signal could be subject to interference. Instead by using the predicted field strength at such locations, the Commission ensures that the ISIX Methodology evaluates service and potential interference in the flagged cells just as it would in non-flagged cells. The Commission’s approach does not alter or otherwise affect the treatment of error warnings in applying the OET-69 methodology as set forth in the Incentive Auction R&O.

46. Aggregate Wireless Interference to DTV. The Commission declines to consider the potential impact of interference from multiple wireless base stations on DTV reception when applying the ISIX Methodology for Case 3 during the incentive auction. Broadcasters express concern that LTE signals could combine at the point of DTV signal reception, increasing the potential for interference. They urge the Commission to use either a simple direct summation of signals or the Root Square Sum (RSS) method for calculating interference from multiple DTS transmitters under the current rules. The Commission concludes that neither of these approaches is appropriate here because the ISIX Methodology necessarily relies on hypothetical placement of wireless base stations every ten kilometers with no regard to whether

actual operation on those locations is desirable or possible. First, the hypothetical wireless base stations are placed even within the contours of television stations – a situation that will not occur in reality. Therefore, aggregating the interference from those hypothetical base stations would not provide any meaningful information and would not improve the accuracy of the ISIX Methodology. The Commission also observes that in order to manage interference within their systems, wireless providers may not operate on a given frequency block simultaneously at all of their cell sites. Thus, aggregating signals from all of the hypothetical base stations would not improve the estimates of impairments, would tend to produce a “worst case” scenario, and overestimate potential interference. Moreover, the patterns of frequency use that would be optimal for wireless providers are not clear because they would vary with terrain and other considerations. As a result, it would not improve the accuracy of the impairment estimates to assume a standard frequency re-use pattern for the ISIX methodology. The Commission also notes that aggregating the signal strengths from each hypothetical wireless base station within the 500 kilometer culling distances of a co-channel or adjacent channel television station could result in impairing all, or nearly all, of the locations considered. That is because locations whose own contributions to interference would be below the D/U threshold could be considered sources of interference when interference is aggregated with other hypothetical base stations. Also it might be more useful for wireless providers to have impairment information based on the individual wireless base station. Finally, the plan to consider a whole county impaired if even one of the hypothetical ten-by-ten kilometer cells located in that county is predicted to cause interference will provide a conservative approach in establishing impairments that should address Joint Broadcasters’ concerns. Therefore, because the RSS method would not improve the accuracy of the estimates of interference potential during the auction, it will not be used when determining impairments to the wireless licenses during the auction.

Wireless User Equipment to Digital Television Receiver (Case 4)

47. The Commission adopted fixed geographic separation distances for Case 4. Specifically, wireless user equipment (i.e. mobile and portable devices) will be prohibited from co-channel or adjacent-

channel operations within a television station's contour and within a set distance from the station's contour. The Commission determined that the appropriate distance is five kilometers for co-channel operations, and one-half kilometer for adjacent-channel operations.

48. The Commission finds that a simple, fixed-distance approach is warranted for Case 4 because it involves short distances only. Wireless user equipment transmits at relatively low power and its location is usually closely bound to the vicinity of its associated base station. In addition, outdoor operation of wireless user equipment usually involves heights above ground on the order of 1.5 meters, resulting in significant attenuation of signals by ground clutter. Wireless user equipment operating in buildings may be significantly higher than 1.5 meters, but signals are significantly attenuated by walls indoors. As a result of these factors, the potential for wireless user equipment to cause harmful interference to television service operating co-channel or adjacent channel occurs only at short distances of a few kilometers. At these distances, the number of grid cells in a television station's coverage area that could be affected by wireless user equipment is limited to a few cells in the interference range of the devices rather than all of the cells in the station's coverage area. In addition, the Longley-Rice Model is not designed for distances less than a kilometer and relies on either free-space or line-of-sight predictions for such distances. The Commission also observed that use of site-by-site Longley-Rice evaluations for Case 4 would necessitate the development of complex and detailed maps of locations where user equipment can operate.

49. In view of these considerations, the Commission finds that a separation distance approach can adequately protect that station's service. Such an approach is also more administratively efficient for wireless service licensees because it will avoid the need for computerized evaluations required by the Longley-Rice model and maps of locations where wireless user equipment may operate. Instead, wireless providers will be able to design their networks to avoid operation of wireless end user equipment within the contour of television station and within the specified separation distances. For these reasons, the Commission concludes that applying the Longley-Rice propagation model is not warranted for Case 4, because it would increase the ISIX Methodology's complexity without resulting in more accurate

interference predictions. The Commission therefore will use a straightforward distance separation approach for Case 4. As described in the Technical Appendix of the Second Report and Order, the Commission finds that the appropriate model for the short distances associated with Case 4 is the OET TM91-1 propagation model. Using this model the Commission calculated that broadcast television service will be protected from interference from wireless user equipment if such devices are not permitted to operate within the contours of the television station and within five kilometers if co-channel or a half kilometer if operating on the adjacent channel.

The Spectrum Act Does Not Preclude Use of the ISIX Methodology and Input Values to Predict or Prevent Inter-Service Interference

50. The Commission rejects the Joint Broadcasters' claim that section 6403(b)(2) of the Spectrum Act limits its authority to adopt the ISIX Methodology and input values to address inter-service interference. Section 6403(b)(2) requires the Commission, in "making any reassignments or reallocations," to "make all reasonable efforts to preserve, as of [February 22, 2012], the coverage area and population served of each broadcast television licensee, as determined using the methodology described in OET Bulletin 69" The Joint Broadcasters argue that the Commission's efforts "to preserve" broadcasters' coverage area and population served from inter-service interference will violate section 6403(b)(2) unless it used "the methodology described in OET Bulletin 69."

51. The Commission disagrees. As explained in the Incentive Auction R&O, the coverage area and population served of broadcasters, including any assigned to spectrum in the 600 MHz Band, must be "determined" using "the methodology described in OET Bulletin 69," as required by section 6403(b)(2). The ISIX Methodology and input values the Commission adopted in this Order (for use during the auction) will not be used to "determine[]" coverage area and population served. Rather, they will be used "to preserve" the coverage area and population served that has already been "determined" through the methodology set forth in the Incentive Auction R&O. These efforts are not restricted by the statute's reference to "the methodology described in OET Bulletin 69."

PROCEDURAL MATTERS

Final Regulatory Flexibility Analysis

52. As required by § 603 of the Regulatory Flexibility Act of 1980 (RFA), 5 U.S.C. 603, the Commission has prepared a Final Regulatory Flexibility Analysis of the possible economic impact on small entities of the policies and rules adopted in the Second Report and Order. This Final Regulatory Flexibility Analysis is set forth in Appendix F of the Second Report and Order.

53. The Second Report and Order contains modified information collection requirements subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13. It will be submitted to the Office of Management and Budget (OMB) for review under section 3507(d) of the PRA. OMB, the general public, and other federal agencies are invited to comment on the modified information collection requirements contained in this proceeding. In addition, pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, see 44 U.S.C. 3506(c)(4), we previously sought specific comment on how the Commission might further reduce the information collection burden for small business concerns with fewer than 25 employees.

54. The Commission has assessed the effects of the policies adopted in the Second Report and Order with regard to information collection burdens on small business concerns, and find that these policies will benefit companies with fewer than 25 employees by providing them with a safeguard in the unlikely event of aggregate new interference in excess of one percent. In addition, we have described impacts that might affect small businesses, which includes most businesses with fewer than 25 employees, in the FRFA attached to the Second Report and Order as Appendix F.

FINAL REGULATORY FLEXIBILITY ANALYSIS

55. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),¹ an Initial

¹ See 5 U.S.C. 603. The RFA, see 5 U.S.C. 601 – 612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Public Law 104-121, Title II, 110 Stat. 857 (1996), and the Small Business Jobs Act of 2010, Public Law 111-240, 124 Stat. 2504 (2010).

Regulatory Flexibility Analysis (IRFA) was incorporated in the Notice of Proposed Rulemaking (NPRM) in ET Docket No. 12-268.² The Commission sought written public comment on the proposals in the NPRM, including comment on the IRFA.³ This present Final Regulatory Flexibility Analysis (FRFA) conforms to the RFA.⁴

Need for, and Objective of, the Second Report and Order.

56. In the Second Report and Order, the Commission addresses several outstanding issues related to the Incentive Auction R&O.⁵ First, we address and reject proposals for additional limits on any new interference between television stations as result of the repacking process.⁶ Second, we establish a methodology and the associated input values to predict inter-service interference between television and wireless services in certain areas for use during the incentive auction (ISIX Methodology).⁷

Summary of Significant Issues Raised by Public Comments in Response to the IRFA.

57. No comments were filed in direct response to the IRFA.

² See Expanding the Economic and Innovation Opportunities of Spectrum through Incentive Auctions, GN Docket No. 12-268, Notice of Proposed Rulemaking, 27 FCC Rcd 12357 (2012).

³ Additional comment on the specific proposals addressed in the Second Report & Order was sought with the issuance of three separate Public Notices. See Incentive Auction Task Forces Releases Updated Constraint File Data Using Actual Channels and Staff Analysis Regarding Pairwise Approach to Preserving Population Served, GN Docket No. 12-268, ET Docket No. 13-26, Public Notice, 29 FCC Rcd 5687 (2014). See also Office of Engineering and Technology Seeks to Supplement the Incentive Auction Proceeding record Regarding Potential Interference Between Broadcast Television and Wireless Services, GN Docket No. 12-268, ET Docket No. 14-14, Public Notice, 29 FCC Rcd 712 (2014); Office of Engineering and Technology Seeks Comment on Measurements of LTE into DTV Interference, Public Notice, GN Docket No. 12-268, ET Docket No. 14-14, DA 14-852 (2014).

⁴ See 5 U.S.C. 604.

⁵ See Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, GN Docket No. 12-268, Report and Order, 29 FCC Rcd 6567 (2014) (Incentive Auction R&O).

⁶ See id. at 6651, para. 182. The Commission adopted a 0.5 percent “pairwise” or station-to-station limit on any new interference as a result of the repacking process in the Incentive Auction R&O. See id. at 6649-51, paras. 179-81.

⁷ See id. at 6605-6, paras. 82-84. The Commission will address the specific uses to be made of the interference predictions in the forthcoming Comment PN on final auction procedures. See note 79, para. 23 of the Second Report and Order.

Response to Comments by the Chief Counsel for Advocacy of the Small Business Administration.

58. Pursuant to the Small Business Jobs Act of 2010, the Commission is required to respond to any comments filed by the Chief Counsel for Advocacy of the Small Business Administration (SBA), and to provide a detailed statement of any change made to the proposed rules as a result of those comments. The Chief Counsel did not file any comments in response to the proposed rules in this proceeding.

Description and Estimate of the Number of Small Entities to Which the Rules Will Apply.

59. The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.⁸ The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction." In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.⁹ A small business concern is one which: 1) is independently owned and operated; 2) is not dominant in its field of operation; and 3) satisfies any additional criteria established by the SBA.¹⁰

60. Television Broadcasting. This economic census category "comprises establishments primarily engaged in broadcasting images together with sound. These establishments operate television broadcasting studios and facilities for the programming and transmission of programs to the public."¹¹ The SBA has created the following small business size standard for Television Broadcasting firms: those having \$38.5 million or less in annual receipts.¹² The Commission has estimated the number of licensed

⁸ Id. at 603(b)(3).

⁹ 5 U.S.C. 601(3) (incorporating by reference the definition of "small business concern" in 15 U.S.C. 632). Pursuant to the RFA, the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register." 5 U.S.C. 601(3).

¹⁰ Small Business Act, 15 U.S.C. 632 (1996).

¹¹ U.S. Census Bureau, 2012 NAICS Definitions: 515120 Television Broadcasting, <http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=515120&search=2012> (last visited Mar. 6, 2014).

¹² 13 CFR 121.201 (NAICS code 515120) (updated for inflation in 2010).

commercial television stations to be 1,388.¹³ In addition, according to Commission staff review of the BIA Advisory Services, LLC's Media Access Pro Television Database on March 28, 2012, about 950 of an estimated 1,300 commercial television stations (or approximately 73 percent) had revenues of \$38.5 million or less.¹⁴ We therefore estimate that the majority of commercial television broadcasters are small entities.

61. We note, however, that in assessing whether a business concern qualifies as small under the above definition, business (control) affiliations must be included.¹⁵ Our estimate, therefore, likely overstates the number of small entities that might be affected by our action because the revenue figure on which it is based does not include or aggregate revenues from affiliated companies. In addition, an element of the definition of "small business" is that the entity not be dominant in its field of operation. We are unable at this time to define or quantify the criteria that would establish whether a specific television station is dominant in its field of operation. Accordingly, the estimate of small businesses to which rules may apply does not exclude any television station from the definition of a small business on this basis and is therefore possibly over-inclusive to that extent.

62. In addition, the Commission has estimated the number of licensed noncommercial educational ("NCE") television stations to be 396.¹⁶ These stations are non-profit, and therefore considered to be small entities.¹⁷

63. There are also 2,414 LPTV stations, including Class A stations, and 4,046 TV translator

¹³ See FCC News Release, Broadcast Station Totals as of December 31, 2013 (rel. Jan. 8, 2014), http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0108/DOC-325039A1.pdf.

¹⁴ We recognize that BIA's estimate differs slightly from the FCC total given the information provided above.

¹⁵ "[Business concerns] are affiliates of each other when one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both." 13 CFR 121.103(a)(1).

¹⁶ See FCC News Release, Broadcast Station Totals as of December 31, 2013 (rel. Jan. 8, 2014), http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0108/DOC-325039A1.pdf.

¹⁷ See generally 5 U.S.C. 601(4), (6).

stations.¹⁸ Given the nature of these services, we will presume that all of these entities qualify as small entities under the above SBA small business size standard.

64. Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing. The Census Bureau defines this category as follows: “This industry comprises establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment. Examples of products made by these establishments are: transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment.” The SBA has developed a small business size standard for Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing, which is: all such firms having 750 or fewer employees. According to Census Bureau data for 2007, there were a total of 939 establishments in this category that operated for part or all of the entire year. Of this total, 912 had less than 500 employees and 17 had more than 1000 employees. Thus, under that size standard, the majority of firms can be considered small.

65. Audio and Video Equipment Manufacturing. The SBA has classified the manufacturing of audio and video equipment under in NAICS Codes classification scheme as an industry in which a manufacturer is small if it has less than 750 employees. Data contained in the 2007 U.S. Census indicate that 492 establishments operated in that industry for all or part of that year. In that year, 488 establishments had fewer than 500 employees; and only 1 had more than 1000 employees. Thus, under the applicable size standard, a majority of manufacturers of audio and video equipment may be considered small.

66. Wireless Telecommunications Carriers (except satellite). The Census Bureau defines this category as follows: “This industry comprises establishments engaged in operating and maintaining switching and transmission facilities to provide communications via the airwaves. Establishments in this

¹⁸ See FCC News Release, Broadcast Station Totals as of December 31, 2013 (rel. January 8, 2014), http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0108/DOC-325039A1.pdf.

industry have spectrum licenses and provide services using that spectrum, such as cellular phone services, paging services, wireless Internet access, and wireless video services.”¹⁹ The appropriate size standard under SBA rules is for the category Wireless Telecommunications Carriers (except Satellite). The size standard for that category is that a business is small if it has 1,500 or fewer employees.²⁰ For this category, census data for 2007 show that there were 1,383 firms that operated for the entire year.²¹ Of this total, 1,368 firms had employment of 999 or fewer employees and 15 had employment of 1000 employees or more.²² Similarly, according to Commission data, 413 carriers reported that they were engaged in the provision of wireless telephony, including cellular service, PCS, and Specialized Mobile Radio (“SMR”) Telephony services.²³ Of these, an estimated 261 have 1,500 or fewer employees and 152 have more than 1,500 employees.²⁴ Consequently, the Commission estimates that approximately half or more of these firms can be considered small. Thus, using available data, we estimate that the majority of wireless firms can be considered small.

Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements for Small Entities.

67. The Second Report and Order provides that, if a full power or Class A station is predicted to receive aggregate new interference above one percent on the final channel assigned to it following the repacking process, it may file an application proposing an alternate channel or expanded facilities in a priority filing window, along with a limited number of other stations that have been assigned the same priority. This opportunity will be available to any station entitled to protection in the repacking process

¹⁹ U.S. Census Bureau, 2012 NAICS Definitions: 517210 Wireless Telecommunications Carriers (except Satellite), <http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517210&search=2012> (last visited Mar. 6, 2014).

²⁰ 13 CFR 121.201 (NAICS code 517210).

²¹ U.S. Census Bureau, Table No. EC0751SSSZ5, Information: Subject Series - Establishment and Firm Size: Employment Size of Firms for the United States: 2007 (NAICS code 517210), http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ5.

²² Id. Available census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with 1000 employees or more.

²³ See Trends in Telephone Service at Table 5.3.

²⁴ See id.

that is predicted to experience aggregate new interference in excess of one percent, regardless of whether that station was reassigned to a new channel in the repacking process.

Steps Taken to Minimize Significant Economic Impact on Small Entities, and Significant Alternatives Considered

68. The RFA requires an agency to describe any significant alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): 1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; 2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; 3) the use of performance, rather than design, standards; and 4) an exemption from coverage of the rule, or any part thereof, for small entities.²⁵

69. The Commission believes that applying the same rules equally to all entities in this context promotes fairness. The Commission does not believe that the costs and/or administrative burdens associated with the rules will unduly burden small entities. Moreover, the revisions the Commission adopts should benefit small entities by providing them with a safeguard in the event of aggregate new interference above one percent.

Report to Congress

70. The Commission will send a copy of the Second Report and Order, including this FRFA, in a report to Congress and the Government Accountability Office pursuant to the Congressional Review Act.²⁶ In addition, the Commission will send a copy of the Second Report and Order, including this FRFA, to the Chief Counsel for Advocacy of the SBA.

71. The Commission will send a copy of the Second Report and Order to Congress and the Government Accountability Office pursuant to the Congressional Review Act.

²⁵ 5 U.S.C. 603(c).

²⁶ See 5 U.S.C. 801(a)(1)(A).

72. Pursuant to the authority found in sections 1, 4, 301, 303, 307, 308, 309, 310, 316, 319, 332, and 403 of the Communications Act of 1934, as amended, and sections 6004, 6402, 6403, 6404, and 6407 of Middle Class Tax Relief and Job Creation Act of 2012, Public Law 112-96, 126 Stat. 156, 47 U.S.C. 151, 154, 301, 303, 307, 308, 309, 310, 316, 319, 332, 403, 1404, 1452, and 1454, and § 1.2 of the Commission's rules, 47 CFR 1.2, the Second Report and Order, **IS ADOPTED. IT IS FURTHER ORDERED** that the Commission's rules **ARE HEREBY AMENDED** as set forth in Appendix B of the Second Report and Order.

73. The rules adopted herein **WILL BECOME EFFECTIVE [Insert date 30 days after the date of publication in the Federal Register]**, except for §§ 73.3700(b)(1)(iv)(B), 73.3700(b)(2)(i) introductory text, and 73.3700(b)(2)(ii) of the rules which contain new or modified information collection requirements subject to the Paperwork Reduction Act of 1995, Public Law 104-13, that are not effective until approved by the Office of Management and Budget (OMB). The Federal Communications Commission will publish a document in the Federal Register announcing OMB approval and the effective date of this rule.

74. The Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, **SHALL SEND** a copy of this Second Report and Order in GN Docket No. 12-268, including the Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

75. The Commission **SHALL SEND** a copy of this Second Report and Order in GN Docket No. 12-268 in a report to be sent to Congress and the Government Accountability Office pursuant to the Congressional Review Act, see 5 U.S.C. 801(a)(1)(A).

List of Subjects in 47 CFR Part 73

Communications equipment, Education, Reporting and recordkeeping requirements.

FEDERAL COMMUNICATIONS COMMISSION.

Marlene H. Dortch,
Secretary.

Final Rules

For the reasons discussed in the preamble, the Federal Communications Commission amends 47 CFR part 73 as follows:

PART 73—RADIO BROADCAST SERVICES

1. The authority citation for part 73 continues to read as follows:

Authority: 47 U.S.C. 154, 303, 334, 336, and 339.

2. Section 73.3700 is amended by revising paragraphs (b)(1)(iv), (b)(2)(i) introductory text, and (b)(2)(ii) to read as follows:

§ 73.3700 Post-incentive auction licensing and operation.

* * * * *

(b) * * *

(1) * * *

(iv) Priority filing window. (A) The licensee of a reassigned station, a UHF-to-VHF station, or a High-VHF-to-Low-VHF station that, for reasons beyond its control, is unable to construct facilities that meet the technical parameters specified in the Channel Reassignment Public Notice, or the permissible contour coverage variance from those technical parameters specified in paragraph (b)(1)(ii) or (iii) of this section, may request a waiver of the construction permit application deadline specified in paragraph (b)(1)(i) no later than 30 days prior to the deadline. If its waiver request is granted, the licensee will be afforded an opportunity to submit an application for a construction permit pursuant to paragraph (b)(2)(i) or (ii) of this section in a priority filing window to be announced by the Media Bureau by public notice.

(B) The licensee of any broadcast television station that the Commission makes all reasonable efforts to preserve pursuant to section 6403(b)(2) of the Spectrum Act that is predicted to experience aggregate new interference to population served in excess of one percent as a result of the repacking process will be afforded an opportunity to submit an application for a construction permit pursuant to paragraph (b)(2)(i)

or (ii) of this section in the priority filing window required by paragraph (b)(1)(iv)(A).

* * * * *

(2) * * *

(i) Alternate channels. The licensee of a reassigned station, a UHF-to-VHF station, a High-VHF-to-Low-VHF station, or a broadcast television station described in paragraph (b)(1)(iv)(B) of this section will be permitted to file a major change application for a construction permit for an alternate channel on FCC Form 301, 301-CA, or 340 during a filing window to be announced by the Media Bureau by public notice, provided that:

* * * * *

(ii) Expanded facilities. The licensee of a reassigned station, a UHF-to-VHF station, a High-VHF-to-Low-VHF station, or a broadcast television station described in paragraph (b)(1)(iv)(B) of this section will be permitted to file a minor change application for a construction permit on FCC Form 301, 301-CA, or 340 during a filing window to be announced by the Media Bureau by public notice, in order to request a change in the technical parameters specified in the Channel Reassignment Public Notice (or, in the case of a broadcast television station described in paragraph (b)(1)(iv)(B) that is not reassigned to a new channel, a change in its authorized technical parameters) with respect to height above average terrain (HAAT), effective radiated power (ERP), or transmitter location that would be considered a minor change under §§ 73.3572(a)(1),(2) or 74.787(b) of this chapter.

* * * * *

[FR Doc. 2014-29687 Filed 12/22/2014 at 8:45 am; Publication Date: 12/23/2014]